

Virginia Administrative Code
Title 12. Health
Agency 5. Department of Health
Chapter 481. Virginia Radiation Protection Regulations

12VAC5-481-3140. Purpose.

Part XIV. Radiation Safety Requirements for Wireline Service Operations and Subsurface Tracer Studies

Article 1. Purpose and Scope

The regulations in this part establish radiation safety requirements for using sources of radiation for wireline service operations including mineral-logging, radioactive markers, and subsurface tracer studies. The requirements of this part are in addition to, and not in substitution for, the requirements of Parts I ([12VAC5-481-10](#) et seq.), II ([12VAC5-481-260](#) et seq.), III ([12VAC5-481-380](#) et seq.), IV ([12VAC5-481-600](#) et seq.), and X ([12VAC5-481-2250](#) et seq.) of this chapter.

12VAC5-481-3150. Scope.

The regulations in this part apply to all licensees or registrants who use sources of radiation for wireline service operations including mineral-logging, radioactive markers, or subsurface tracer studies.

12VAC5-481-3151. Licensing.

A. The agency will approve an application for a specific license for the use of licensed material in well logging if the applicant meets the following requirements:

1. The applicant satisfies the general requirements specified in [12VAC5-481-440](#) and [12VAC5-481-450](#) .
2. The applicant shall develop a program for training logging supervisors and logging assistants and submit to the agency a description of this program that specifies:
 - a. Initial training;
 - b. On-the-job training;
 - c. Annual safety reviews provided by the licensee;
 - d. Means the applicant will use to demonstrate the logging supervisor's knowledge and understanding of and ability to comply with the agency's regulations and licensing requirements and the applicant's operating and emergency procedures; and
 - e. Means the applicant will use to demonstrate the logging assistant's knowledge and understanding of and ability to comply with the applicant's operating and emergency procedures.

3. The applicant shall submit to the agency written operating and emergency procedures as described in [12VAC5-481-3280](#) or an outline or summary of the procedures that includes the important radiation safety aspects of the procedures.
4. The applicant shall establish and submit to the agency its program for annual inspections of the job performance of each logging supervisor to ensure that the agency's regulations, license requirements, and the applicant's operating and emergency procedures are followed. Inspection records shall be retained for three years after each annual internal inspection.
5. The applicant shall submit a description of its overall organizational structure as it applies to the radiation safety responsibilities in well logging, including specified delegations of authority and responsibility.
6. If an applicant wants to perform leak testing of sealed sources, the applicant shall identify the manufacturers and the model numbers of the leak test kits to be used. If the applicant wants to analyze its own wipe samples, the applicant shall establish procedures to be followed and submit a description of these procedures to the agency. The description must include the following:
 - a. Instruments to be used;
 - b. Methods of performing the analysis; and
 - c. Pertinent experience of the person who will analyze the wipe samples.

12VAC5-481-3160. Agreement with Well Owner.

Article 2. Prohibition

A. No licensee shall perform wireline service operations with a sealed source(s) unless, prior to commencement of the operation, the licensee has a written agreement with the well operator, well owner, drilling contractor, or land owner that:

1. In the event a sealed source is lodged downhole, a reasonable effort at recovery will be made;
2. No person may attempt to recover a sealed source in a manner which, in the licensee's opinion, could result in its rupture;
3. In the event a decision is made to abandon the sealed source downhole, the requirements of [12VAC5-481-3370](#) C shall be met;
4. The radiation monitoring required in [12VAC5-481-3340](#) will be performed; and
5. If the environment, any equipment, or personnel are contaminated with licensed material, they must be decontaminated before release from the site or release for unrestricted use.

B. The licensee shall retain a copy of the written agreement for three years after the completion of the well logging operation.

12VAC5-481-3170. Limits on Levels of Radiation.

Article 3. Equipment Control

Sources of radiation shall be used, stored, and transported in such a manner that the transportation requirements of Part XIII ([12VAC5-481-2950](#) et seq.) of this chapter and the dose limitation requirements of Part IV ([12VAC5-481-600](#) et seq.) of this chapter are met.

12VAC5-481-3180. Storage Precautions.

A. Each source of radiation, except accelerators, shall be provided with a storage or transport container. The container shall be provided with a lock, or tamper seal for calibration sources, to prevent unauthorized removal of, or exposure to, the source of radiation.

B. Sources of radiation shall be stored in a manner that will minimize danger from explosion or fire.

12VAC5-481-3190. Transport Precautions.

Transport containers shall be physically secured to the transporting vehicle to prevent accidental loss, tampering, or unauthorized removal.

12VAC5-481-3200. Radiation Survey Instruments.

A. The licensee or registrant shall maintain sufficient calibrated and operable radiation survey instruments at each field station to make physical radiation surveys as required by this part and by Part IV ([12VAC5-481-600](#) et seq.). Instrumentation shall be capable of measuring 0.001 mSv (0.1 mrem) per hour through at least 0.5 mSv (50 mrem) per hour.

B. Each radiation survey instrument shall be calibrated:

1. At intervals not to exceed six months and after each instrument servicing;
2. For linear scale instruments, at two points located approximately 25% and 75% of full-scale on each scale; for logarithmic scale instruments, at midrange of each decade, and at two points of at least one decade; and for digital instruments, at appropriate points; and
3. So that accuracy within 20% of the true radiation level can be demonstrated on each scale.

C. Calibration records shall be maintained for a period of three years.

12VAC5-481-3210. Leak Testing of Sealed Sources.

A. Requirements. Each licensee using sealed sources of radioactive material shall have the sources tested for leakage. Records of leak test results shall be kept in units of becquerels (microcuries) and maintained for three years after the leak test is performed.

B. Method of Testing. Tests for leakage shall be performed only by persons specifically authorized to perform such tests by the agency, the NRC, or another agreement state. The test sample shall be taken from the surface of the source, source holder, or from the surface

of the device in which the source is stored or mounted and on which one might expect contamination to accumulate. The test sample shall be analyzed for radioactive contamination, and the analysis shall be capable of detecting the presence of 185 Bq (0.0005 µCi) of radioactive material on the test sample.

C. Interval of Testing. Each sealed source (except an energy compensated source (ECS)) shall be tested at intervals not to exceed six months. Each ECS that is not exempt in subsection E of this section must be tested at intervals not to exceed three years. In the absence of a certificate from a transferor indicating that a test has been made prior to the transfer, the sealed source shall not be put into use until tested. If, for any reason, it is suspected that a sealed source may be leaking, it shall be removed from service immediately and tested for leakage as soon as practical.

D. Leaking or Contaminated Sources. If the test reveals the presence of 185 Bq (0.005 µCi) or more of leakage or contamination, the licensee shall immediately withdraw the source from use and shall cause it to be decontaminated, repaired, or disposed of in accordance with these regulations. The licensee shall check the equipment associated with the leaking source for radioactive contamination and, if contaminated, have it decontaminated or disposed of in accordance with these regulations. A report describing the equipment involved, the test results, and the corrective action taken shall be filed with the agency within five days of receiving the test results.

E. Exemptions. The following sources are exempted from the periodic leak test requirements of subsections A through D of this section:

1. Hydrogen-3 sources;
2. Sources of radioactive material with a half-life of 30 days or less;
3. Sealed sources of radioactive material in gaseous form;
4. Sources of beta- or gamma-emitting radioactive material with an activity of 3.7 MBq (100 µCi) or less; and
5. Sources of alpha-emitting radioactive material with an activity of 0.37 MBq (10 µCi) or less.

12VAC5-481-3220. Physical Inventory.

Each licensee or registrant shall conduct a semi-annual physical inventory to account for all sources of radiation. Records of inventories shall be maintained for three years from the date of the inventory and shall include the quantities and kinds of sources of radiation, the location the date of the inventory, and the name of the individual conducting the inventory.

12VAC5-481-3230. Utilization Records.

Each licensee or registrant shall maintain current records, which shall be kept available for three years from the date of the recorded event, showing the following information for each source of radiation:

1. Make, model number, and a serial number or a description of each source of radiation used;
2. The identity of the well-logging supervisor responsible for the source and the logging assistant present;
3. Locations where used and dates of use; and
4. In the case of tracer materials and radioactive markers, the utilization record shall indicate the radionuclide and activity used in a particular well.

12VAC5-481-3240. Design, Performance, and Certification Criteria for Sealed Sources Used in Downhole Operations.

A. Each sealed source, except those containing radioactive material in gaseous form, and ECSs used in downhole operations, shall meet the following minimum criteria:

1. Be of doubly encapsulated construction;
2. Contain radioactive material whose chemical and physical forms are as insoluble and nondispersible as practical; and
3. Certified by one of the following methods:
 - a. For a sealed source manufactured on or before July 14, 1989, a licensee may use the sealed source, for use in well-logging applications if it meets the requirements of USASI N5.10-1968, "Classification of Sealed Radioactive Sources," or the requirements in subdivision 3 b or c of this subsection;
 - b. For a sealed source manufactured after July 1989, a licensee may use the sealed source, for use in well-logging applications if it meets the oil well-logging requirements of ANSI/HPS N43.6-1997, "Sealed Radioactive Sources-Classification"; or
 - c. For a sealed source manufactured after July 14, 1989, a licensee may use the sealed source, for use in well-logging applications, if the sealed source's prototype has been tested and found to maintain its integrity after each of the following tests:
 - (1) Temperature. The test source must be held at -40°C for 20 minutes, 600°C for 1 hour, and then be subject to a thermal shock test with a temperature drop from 600°C to 20°C within 15 seconds.
 - (2) Impact test. A 5 kg steel hammer, 2.5 cm in diameter, must be dropped from a height of 1 m onto the test source.
 - (3) Vibrations test. The test source must be subject to a vibration from 25 Hz to 500 Hz at 5 g amplitude for 30 minutes.
 - (4) Puncture test. A 1 gram hammer and pin, 0.3 cm pin diameter, must be dropped from a height of 1 m onto the test source.
 - (5) Pressure test. The test source must be subject to an external pressure of 1.695×10^7

pascals (24,600 pounds per square inch absolute).

B. Certification documents shall be maintained for inspection by the agency for a period of two years after source disposal. If the source is abandoned downhole, the certification documents shall be maintained until the agency authorizes disposition.

C. Energy Compensated Source (ECS). Licensee use of an ECS, which may contain no greater than 3.7 MBq (100 μ Ci), is exempt from this part, except the following:

1. For well-logging applications with a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of [12VAC5-481-3210](#) , [12VAC5-481-3220](#) and [12VAC5-481-3230](#) .

2. For well-logging applications without a surface casing for protecting fresh water aquifers, use of the ECS is only subject to the requirements of [12VAC5-481-3160](#) , [12VAC5-481-3210](#) , [12VAC5-481-3220](#) , [12VAC5-481-3230](#) , subsection D of this section and [12VAC5-481-3370](#) .

3. ECSs must be registered with the NRC under 10 CFR 32.210 or with an agreement state.

D. Use of a sealed source in a well without a surface casing. The licensee may use a sealed source in a well without a surface casing for protecting fresh water aquifers only if the licensee follows a procedure for reducing the probability of the source becoming lodged in the well. The procedure must be approved by the agency pursuant to [12VAC5-481-3151](#) A 3.

12VAC5-481-3241. Tritium Neutron Generator Target Sources.

A. Use of a tritium neutron generator target source, containing quantities not exceeding 1,110 GBq (30 curies) and in a well with a surface casing to protect fresh water aquifers, is subject to the requirements of this part except [12VAC5-481-3160](#) , [12VAC5-481-3240](#) and [12VAC5-481-3370](#) .

B. Use of a tritium neutron generator target source, containing quantities exceeding 1,110 GBq (30 curies) or in a well without a surface casing to protect fresh water aquifers, is subject to the requirements of this part except [12VAC5-481-3240](#) .

12VAC5-481-3250. Labeling.

A. Each source, source holder, or logging tool containing radioactive material shall bear a durable, legible, and clearly visible marking or label, that has, as a minimum, the standard radiation caution symbol, without the conventional color requirement, and the following wording:

DANGER or CAUTION

RADIOACTIVE MATERIAL

This labeling shall be on the smallest component transported as a separate piece of equipment.

B. Each transport container shall have permanently attached to it a durable, legible, and

clearly visible label which has, as a minimum, the standard radiation caution symbol and the following wording:

DANGER or CAUTION

RADIOACTIVE MATERIAL

NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY)

C. Uranium sinker bars used in well-logging applications shall be legibly impressed with the following words:

CAUTION

RADIOACTIVE DEPLETED URANIUM

NOTIFY CIVIL AUTHORITIES (OR NAME OF COMPANY) IF FOUND

12VAC5-481-3260. Inspection and Maintenance.

A. Each licensee shall visually check source holders, logging tools, and source handling tools, for defects before each use to ensure that the equipment is in good working condition and that required labeling is present. If defects are found, the equipment must be removed from service until repaired, and a record must be made listing: the date of check, name of inspector, equipment involved, defects found, and repairs made. These records must be retained for three years after the defect is found.

B. Each licensee or registrant shall conduct, at intervals not to exceed six months, a program of inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools to assure proper labeling and physical condition. Records of inspection and maintenance shall be maintained for a period of three years.

C. If any inspection conducted pursuant to subsection B of this section reveals damage to labeling or components critical to radiation safety, the device shall be removed from service until repairs have been made.

D. If a sealed source is stuck in the source holder, the licensee shall not perform any operation, such as drilling, cutting, or chiseling, on the source holder unless the licensee is specifically approved by the agency, NRC, or another agreement state to perform this operation.

E. The repair, opening, or modification of any sealed source shall be performed only by persons specifically authorized to do so by the agency, the NRC, or another agreement state.

12VAC5-481-3261. Radioactive Markers.

The licensee may use radioactive markers in wells only if the individual markers contain quantities of licensed material not exceeding the quantities specified in [12VAC5-481-3730](#) . The use of markers is subject only to the requirements of [12VAC5-481-3220](#) .

12VAC5-481-3262. Uranium Sinker Bars.

The licensee may use a uranium sinker bar in well logging applications only if it is legibly impressed with the words "CAUTION -- RADIOACTIVE -- DEPLETED URANIUM" and "NOTIFY CIVIL AUTHORITIES (or COMPANY NAME) IF FOUND."

12VAC5-481-3270. Training Requirements.

Article 4. Requirements for Personal Safety

A. No licensee shall permit any individual to act as a logging supervisor as defined in this part until such individual has:

1. Received instruction in the following and demonstrated an understanding thereof:

a. Fundamentals of radiation safety including:

(1) Characteristics of radiation;

(2) Units of radiation dose and quantity of radioactivity;

(3) Hazards of exposure to radiation;

(4) Levels of radiation from licensed material;

(5) Methods of controlling radiation dose (time, distance, and shielding); and

(6) Radiation safety practices, including prevention of contamination, and methods of decontamination;

b. Radiation detection instruments including:

(1) Use, operation, calibration, and limitations of radiation survey instruments;

(2) Survey techniques; and

(3) Use of personnel monitoring equipment;

c. Equipment to be used including:

(1) Operation of equipment, including source handling equipment and remote handling tools;

(2) Storage, control, and disposal of licensed material; and

(3) Maintenance of equipment;

d. The requirements of pertinent Virginia regulations; and

e. Case histories of accidents in well logging;

2. Received copies of and instruction in the regulations contained in this part and the applicable sections of Parts I ([12VAC5-481-10](#) et seq.), IV ([12VAC5-481-600](#) et seq.), and X ([12VAC5-481-2250](#) et seq.) of this chapter or their equivalent, conditions of appropriate license, and the licensee's operating and emergency procedures, and demonstrated an

understanding thereof;

3. Demonstrated competence to use sources of radiation, related handling tools, and radiation survey instruments which will be used on the job by a field evaluation; and

4. Demonstrated understanding of subdivisions 1 and 2 of this subsection by successfully passing a written test.

B. No licensee or registrant shall permit any individual to act as a logging assistant until such individual has:

1. Received instruction in the applicable sections of Parts I ([12VAC5-481-10](#) et seq.), IV ([12VAC5-481-600](#) et seq.) and X ([12VAC5-481-2250](#) et seq.) of this chapter or their equivalent;

2. Received copies of, and instruction in the licensee's operating and emergency procedures;

3. Demonstrated understanding of subdivisions 1 and 2 of this subsection by successfully passing a written or oral test; and

4. Demonstrated competence to use, under the personal supervision of the logging supervisor, the sources of radiation, related handling tools, and radiation survey instruments that will be used on the job.

C. The licensee shall provide safety reviews at least once during each calendar year.

D. The licensee shall maintain employee training records for three years following termination of the individual's employment.

12VAC5-481-3280. Operating and Emergency Procedures.

The licensee's or registrant's operating and emergency procedures shall include instructions in at least the following:

1. Handling and use of sources of radiation to be employed so that no individual is likely to be exposed to radiation doses in excess of the standards established in Part IV ([12VAC5-481-600](#) et seq.) of this chapter;

2. Methods and occasions for conducting radiation surveys;

3. Methods and occasions for locking and securing sources of radiation;

4. Personnel monitoring and the use of personnel monitoring equipment;

5. Transportation to temporary jobsites and field stations, including the packaging and placing of sources of radiation in vehicles, placarding of vehicles, and securing sources of radiation during transportation;

6. Minimizing exposure of individuals in the event of an accident;

7. Procedure for notifying proper personnel in the event of an accident;

8. Maintenance of records;
9. Use, inspection and maintenance of source holders, logging tools, source handling tools, storage containers, transport containers, and injection tools;
10. Procedure to be followed in the event a sealed source is lodged downhole;
11. Procedures to be used for picking up, receiving, and opening packages containing radioactive material;
12. For the use of tracers, decontamination of the environment, equipment, and personnel;
13. Maintenance of records generated by logging personnel at temporary jobsites;
14. Notifying proper persons in the event of an accident; and
15. Actions to be taken if a sealed source is ruptured, including actions to prevent the spread of contamination and minimize inhalation and ingestion of radioactive material and actions to obtain suitable radiation survey instruments as required by [12VAC5-481-3200](#) .

12VAC5-481-3290. Personnel Monitoring.

- A. No licensee shall permit any individual to act as a logging supervisor or a logging assistant unless each such individual wears either a film badge, OSL or TLD. Each film badge, OSL or TLD shall be assigned to and worn by only one individual. Film badges must be replaced at least monthly and OSLs or TLDs replaced at least quarterly. After replacement, each film badge, OSL or TLD must be promptly processed.
- B. Personnel monitoring records shall be maintained for inspection until the agency authorizes disposition.

12VAC5-481-3300. Security.

Article 5. Precautionary Procedures in Logging and Subsurface Tracer Studies

- A. A logging supervisor must be physically present at a temporary job site whenever licensed materials are being handled or are not stored and locked in a vehicle or storage place. The logging supervisor may leave the job site to obtain assistance if a source becomes lodged in a well.
- B. During well logging, except when radiation sources are below ground or in shipping or storage containers, the logging supervisor or other individual designated by the logging supervisor must maintain direct surveillance of the operation to prevent unauthorized entry into a restricted area as defined in [12VAC5-481-10](#) .

12VAC5-481-3310. Handling Tools.

The licensee shall provide and require the use of tools that will assure remote handling of sealed sources other than low-activity calibration sources.

12VAC5-481-3320. Subsurface Tracer Studies.

A. Protective gloves and other appropriate protective clothing and equipment shall be used by all personnel handling radioactive tracer material. Precautions shall be taken to avoid ingestion or inhalation of radioactive material.

B. No licensee shall cause the injection of radioactive material into potable aquifers without prior written authorization from the agency.

12VAC5-481-3330. Particle Accelerators.

No licensee or registrant shall permit above-ground testing of particle accelerators, designed for use in well-logging, which results in the production of radiation, except in areas or facilities so controlled or shielded that the requirements of [12VAC5-481-630](#) and [12VAC5-481-640](#), as applicable, are met.

12VAC5-481-3340. Radiation Surveys and Contamination Control.

Article 6. Radiation Surveys and Records

A. Radiation surveys or calculations shall be made and recorded for each area where radioactive materials are used and stored.

B. Radiation surveys shall be made and recorded for the radiation levels in occupied positions and on the exterior of each vehicle used to transport radioactive material. Such surveys shall include each source of radiation or combination of sources to be transported in the vehicle.

C. If the sealed source assembly is removed from the logging tool before departing the jobsite, the logging tool detector shall be energized, or a survey meter used, to assure that the logging tool is free of contamination.

D. Radiation surveys shall be made and recorded at the jobsite or well-head for each tracer operation, except those using hydrogen-3, carbon-14, and sulfur-35. These surveys shall include measurements of radiation levels before and after the operation.

E. Records required pursuant to subsections A through D of this section shall include the dates, the identification of individual(s) making the survey, the identification of survey instrument(s) used, and an exact description of the location of the survey. Records of these surveys shall be maintained for three years after completion of the survey.

F. If the licensee detects evidence that a sealed source has ruptured or licensed materials have caused contamination, the licensee shall initiate immediately the emergency procedures required by [12VAC5-481-3280](#) and contact the agency immediately.

G. During efforts to recover a sealed source lodged in the well, the licensee shall continuously monitor, with an appropriate radiation detection instrument or a logging tool with a radiation detector, the circulating fluids from the well, if any, to check for contamination resulting from damage to the sealed source.

H. If contamination results from the use of licensed material in well logging, the licensee shall decontaminate all work area equipment and personnel before release from the site or release for unrestricted use.

12VAC5-481-3350. Documents and Records Required at Field Stations.

Each licensee shall maintain the following documents and records for the specific devices and sources used at the field station:

1. Appropriate license, certificate of registration, or equivalent document(s);
2. Operating and emergency procedures;
3. Copy of Part IV ([12VAC5-481-600](#) et seq.), Part X ([12VAC5-481-2250](#) et seq.) and this part;
4. Records of the latest survey instrument calibrations pursuant to [12VAC5-481-3200](#);
5. Records of the latest leak test results pursuant to [12VAC5-481-3210](#);
6. Records of physical inventories required pursuant to [12VAC5-481-3220](#);
7. Utilization records required pursuant to [12VAC5-481-3230](#);
8. Records of inspection and maintenance required pursuant to [12VAC5-481-3260](#);
9. Survey records required pursuant to [12VAC5-481-3340](#); and
10. Training records required pursuant to [12VAC5-481-3270](#).

12VAC5-481-3360. Documents and Records Required at Temporary Jobsites.

Each licensee or registrant conducting operations at a temporary jobsite shall have the following documents and records available at that site for inspection by the agency:

1. Operating and emergency procedures;
2. Survey records required pursuant to [12VAC5-481-3340](#) for the period of operation at the site;
3. Evidence of current calibration for the radiation survey instruments in use at the site;
4. When operating in the state under reciprocity, a copy of the appropriate license, certificate of registration, or equivalent document(s); and
5. Shipping papers for the transportation of radioactive material.

12VAC5-481-3370. Notification of Incidents, Abandonment, and Lost Sources.

Article 7. Notification

A. Notification of incidents and sources lost in other than downhole logging operations shall be made in accordance with appropriate provisions of Part IV ([12VAC5-481-600](#) et seq.) of this chapter.

B. Whenever a sealed source or device containing radioactive material is lodged downhole, the licensee shall:

1. Monitor at the surface for the presence of radioactive contamination with a radiation survey instrument or logging tool during logging tool recovery operations; and
2. Notify the agency immediately by telephone and subsequently, within 30 days, by confirmatory letter if the licensee knows or has reason to believe that a sealed source has been ruptured. This letter shall identify the well or other location, describe the magnitude and extent of the escape of radioactive material, assess the consequences of the rupture, and explain efforts planned or being taken to mitigate these consequences.

C. When it becomes apparent that efforts to recover the radioactive source will not be successful, the licensee shall:

1. Advise the well-operator of the regulations of the Virginia Department of Mines, Minerals, and Energy; Division of Gas and Oil, regarding abandonment and an appropriate method of abandonment, that shall include:
 - a. The immobilization and sealing in place of the radioactive source with a cement plug,
 - b. The setting of a whipstock or other deflection device, and
 - c. The mounting of a permanent identification plaque at the surface of the well, containing the appropriate information required by subsection D of this section;
2. Notify the agency by telephone, giving the circumstances of the loss, and request approval of the proposed abandonment procedures; and
3. File a written report with the agency within 30 days of the abandonment. The licensee shall send a copy of the report to the Virginia Department of Mines, Minerals, and Energy; Division of Gas and Oil. The report shall contain the following information:
 - a. Date of occurrence;
 - b. A description of the well logging source involved, including the radionuclide and its quantity, chemical, and physical form;
 - c. Surface location and identification of the well;
 - d. Results of efforts to immobilize and seal the source in place;
 - e. A brief description of the attempted recovery effort;
 - f. Depth of the source;
 - g. Depth of the top of the cement plug;
 - h. Depth of the well;
 - i. Any other information, such as a warning statement, contained on the permanent identification plaque; and
 - j. The names of state agencies receiving a copy of this report.

D. Whenever a sealed source containing radioactive material is abandoned downhole, the

licensee shall provide a permanent plaque for posting the well or well-bore. This plaque shall:

1. Be constructed of long-lasting material, such as stainless steel or monel; and
2. Contain the following information engraved on its face:
 - a. The word "CAUTION";
 - b. The radiation symbol without the conventional color requirement;
 - c. The date of abandonment;
 - d. The name of the well operator or well owner;
 - e. The well name and well identification number(s) or other designation;
 - f. The sealed source(s) by radionuclide and activity;
 - g. The source depth and the depth to the top of the plug; and
 - h. An appropriate warning, depending on the specific circumstances of each abandonment.

E. The licensee shall immediately notify the agency by telephone and subsequently by confirming letter if the licensee knows or has reason to believe that radioactive material has been lost in or to an underground potable aquifer. Such notice shall designate the well location and shall describe the magnitude and extent of loss of radioactive material, assess the consequences of such loss, and explain efforts planned or being taken to mitigate these consequences.